THE SCIENCE OF SELF-REGULATION:
IMPLICATIONS FOR PROGRAMS AND POLICIES FOR CHILDREN AND FAMILIES IN POVERTY

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First Things First Early Childhood Summit
Phoenix Arizona August 24-25, 2015

Self-Regulation and Child Development

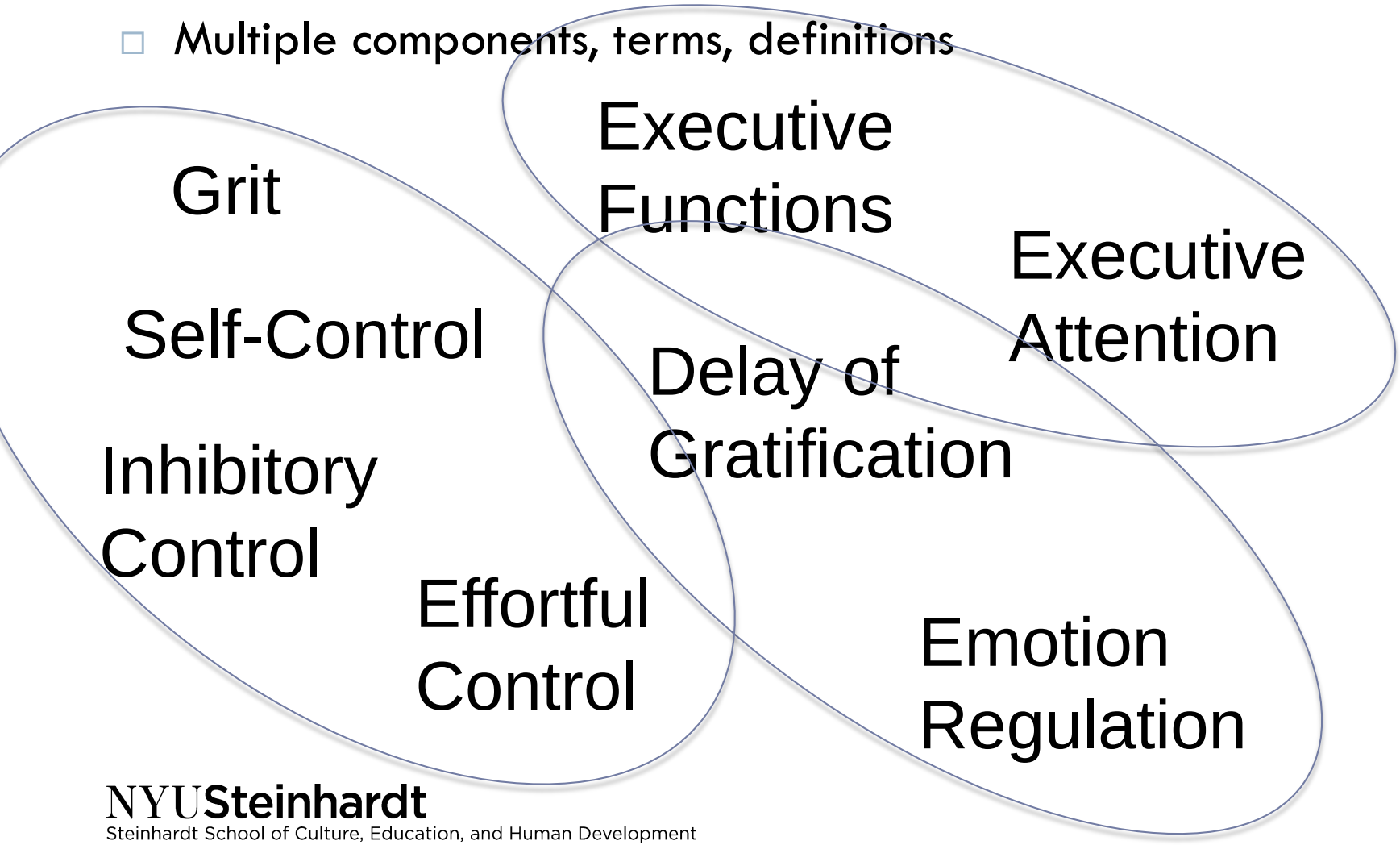
- Self-regulation as a general goal for children's development
- Skills and abilities that enable children to
  - Be exuberant, run and play but also sustain attention and stay focused
  - Be emotionally expressive, but also to regulate emotion
  - Take initiative but also to comply
  - To be conscientious in social interaction

Self-Regulation and Adult Development

- Self-regulation as an important skill for adults
- Skills and abilities that enable us to
  - Handle stress in our jobs and relationships
  - To resist immediate gratification
  - To avoid poor decisions that we later regret
  - To plan and to problem solve
  - To be more effective parents and teachers

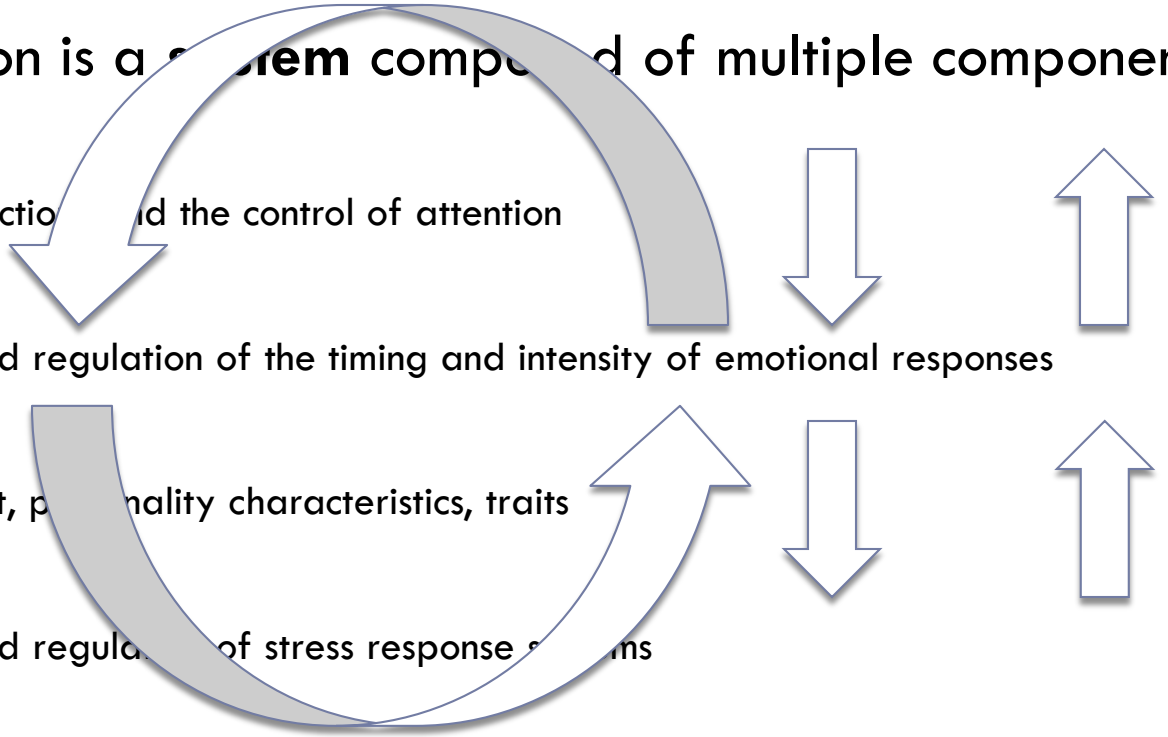
The Science of Self-Regulation

- Multiple components, terms, definitions



The Science of Self-Regulation

- Self-Regulation is a **system** composed of multiple components
  - Cognitive
    - Executive function and the control of attention
  - Emotional
    - Reactivity and regulation of the timing and intensity of emotional responses
  - Behavioral
    - Temperament, personality characteristics, traits
  - Physiological
    - Reactivity and regulation of stress response systems
  - Genetic
    - Differences in catecholamine genes but also in gene expression



Executive Functions

- Early regulation of "lower" level systems sets the stage for the emergence of higher order regulation - Executive Functions
- Healthy physiological, emotional, and attention development in the early years are indicative of healthy development of EF
- Implications
  - Development: Importance of early parenting and early education
  - Measure activity in lower as well as higher level parts of the system
  - Expectation for large effects from high quality services for children and families in highly disadvantaged contexts

Self-Regulation develops from *Other*-Regulation

The Science of Self-Regulation

- It also emerges from initial capabilities in infancy related to **attention, emotion,** and **physiological** characteristics

Attention

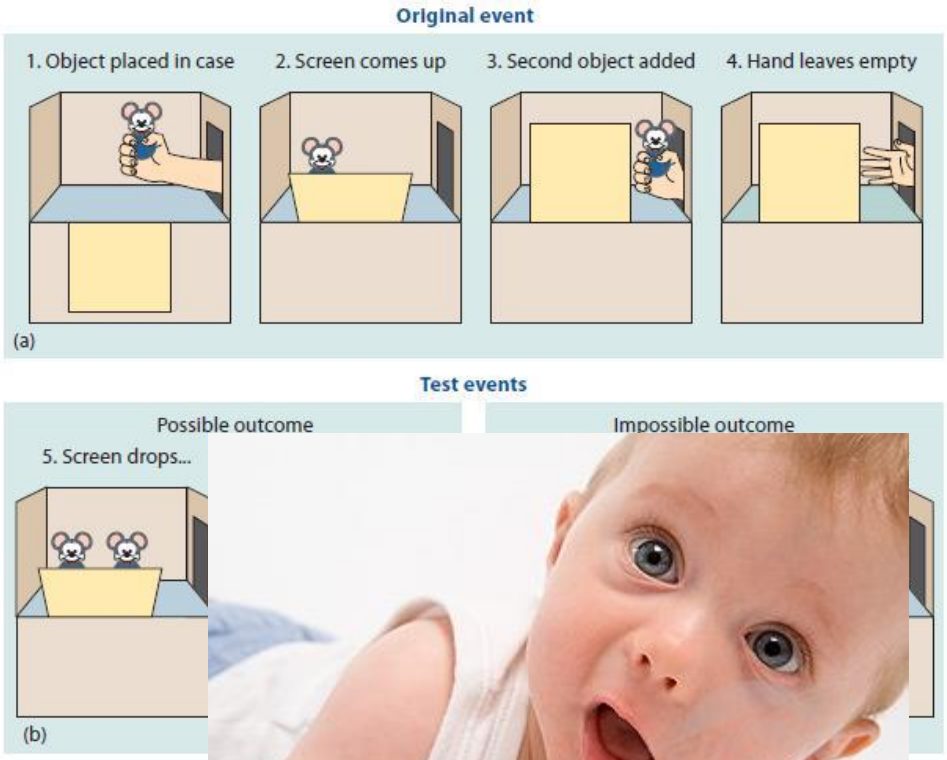


FIGURE **5.4**

INFANTS' NUMBER SENSE. Shown here is one of the sequences in Karen Wynn's (1992) study of 5-month-old infants' number sense. The experimenter was hidden behind the display and manipulated the objects through a trap door in the wall of the display. Five-mo
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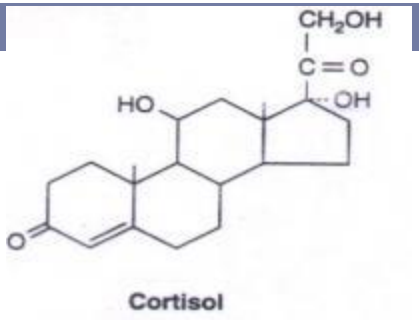
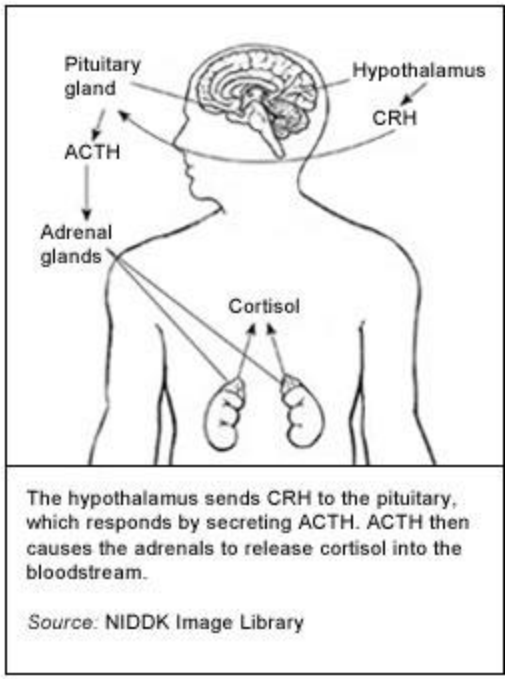
Emotion

Stress Response Physiology

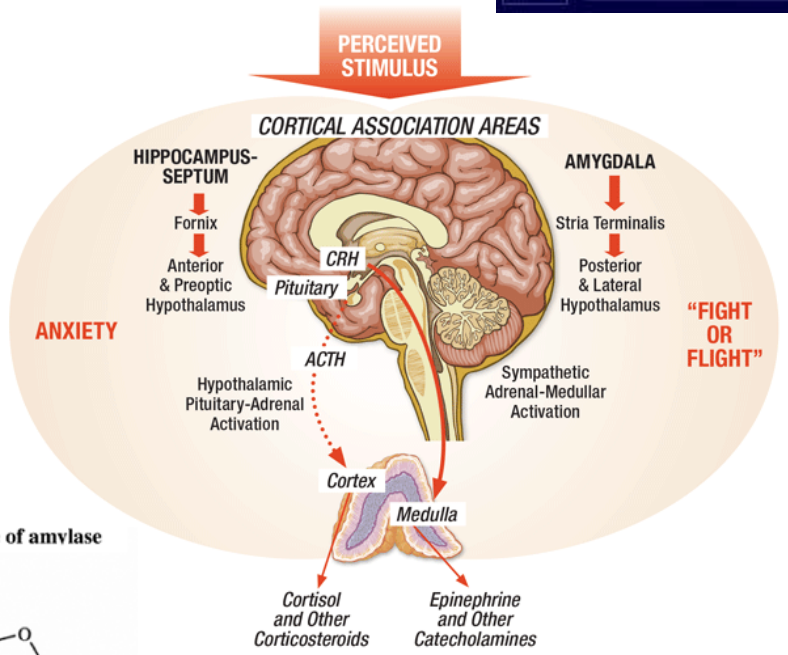


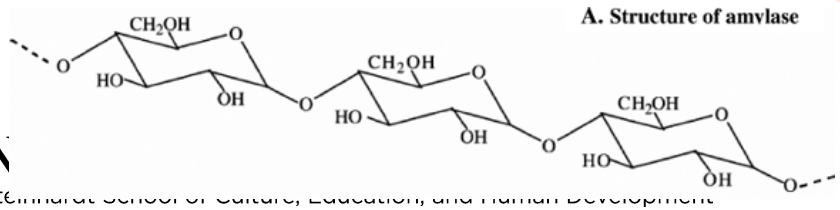
Cortisol



The hypothalamus sends CRH to the pituitary, which responds by secreting ACTH. ACTH then causes the adrenals to release cortisol into the bloodstream.

Source: NIDDK Image Library

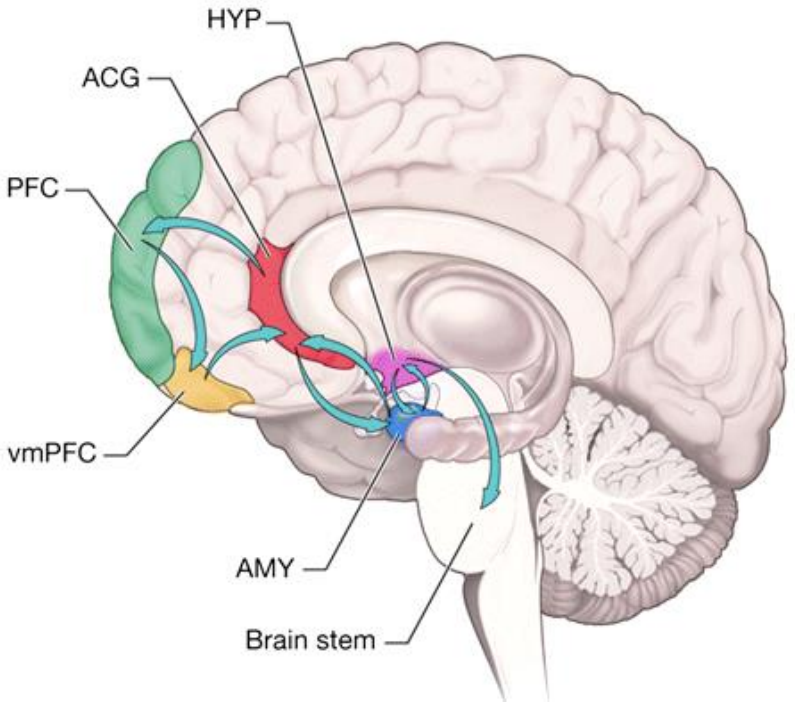




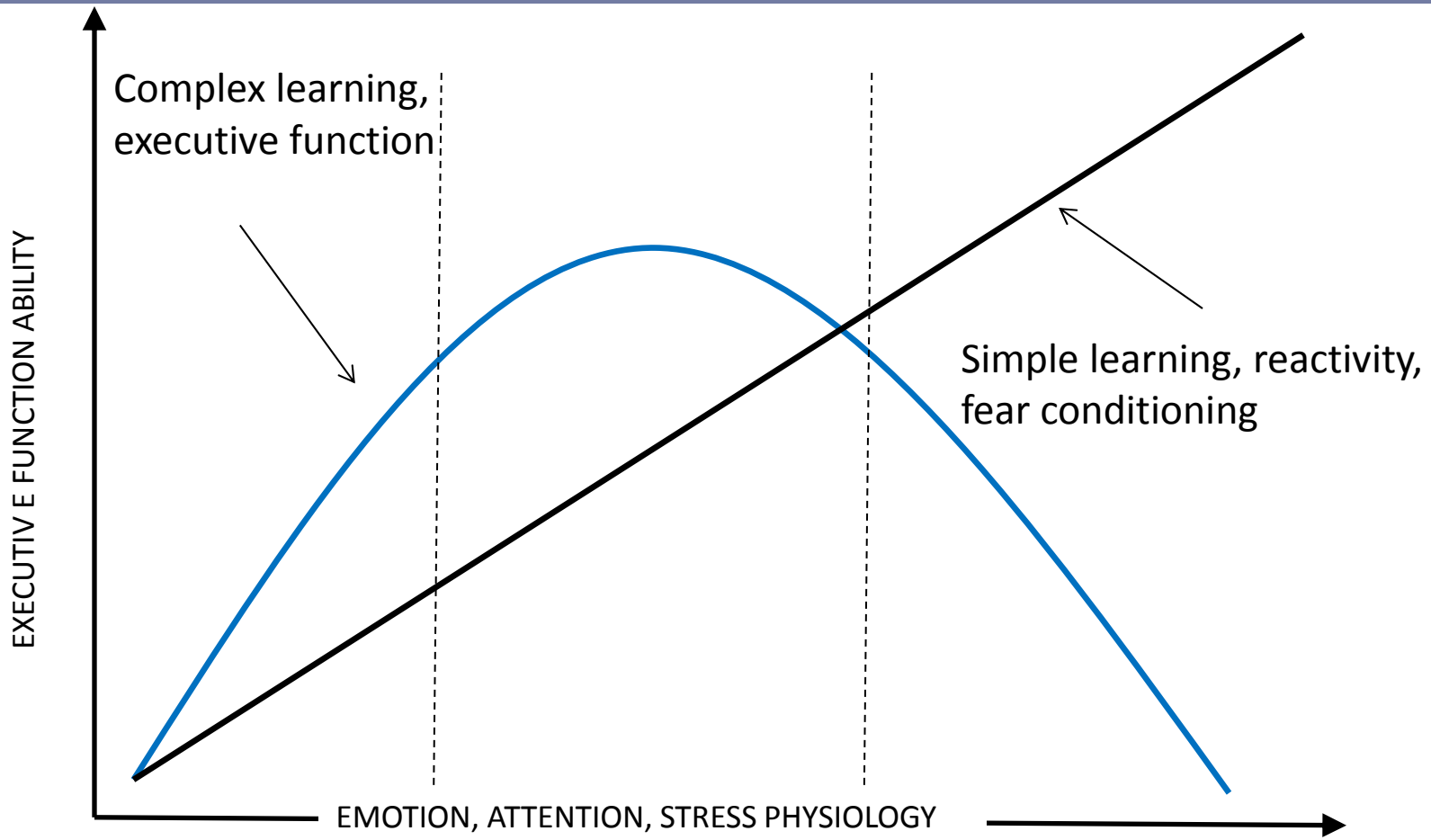
Neuroscience of Self-Regulation

- When we experience stress, physiological systems produce chemicals that prepare the body and mind for response

- Executive functions are associated with prefrontal cortex (PFC) and dependent on levels of stress hormones

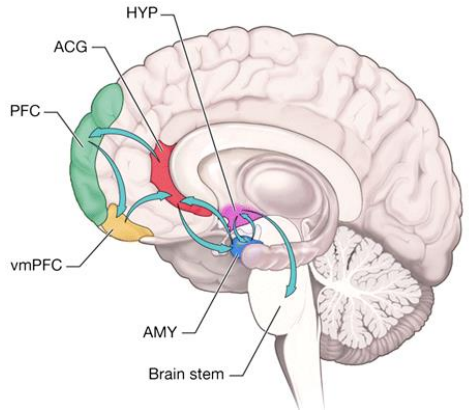


Yerkes-Dodson

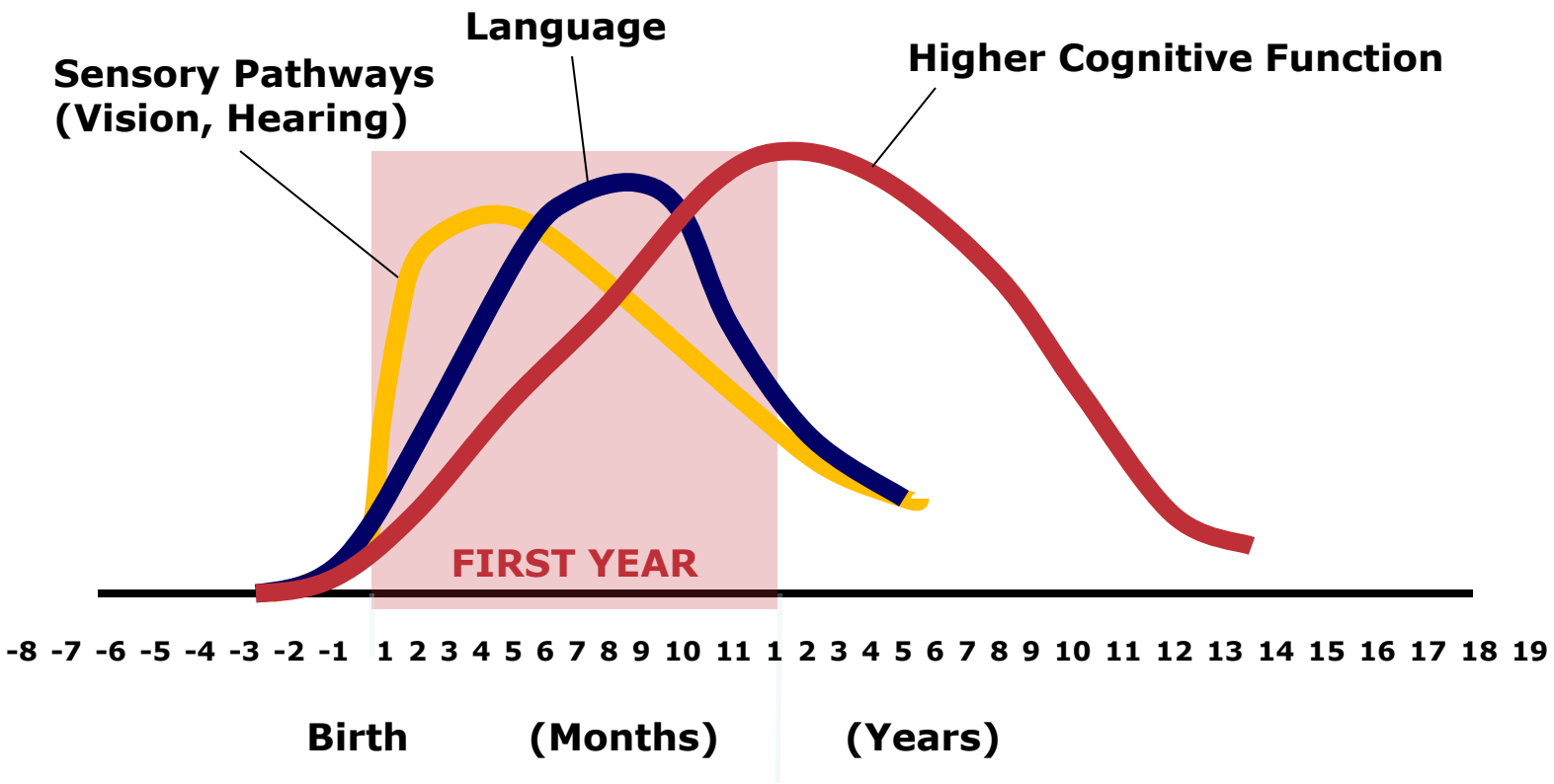


Neuroscience of Self-Regulation

- Brain architecture is established early in life
- Brains are built over time, starting in the earliest years of life. Simple skills come first; more complex skills after
- A strong foundation in the early years improves the odds for positive outcomes
- Stable, caring relationships shape brain architecture
- Toxic stress in the early years derails healthy development



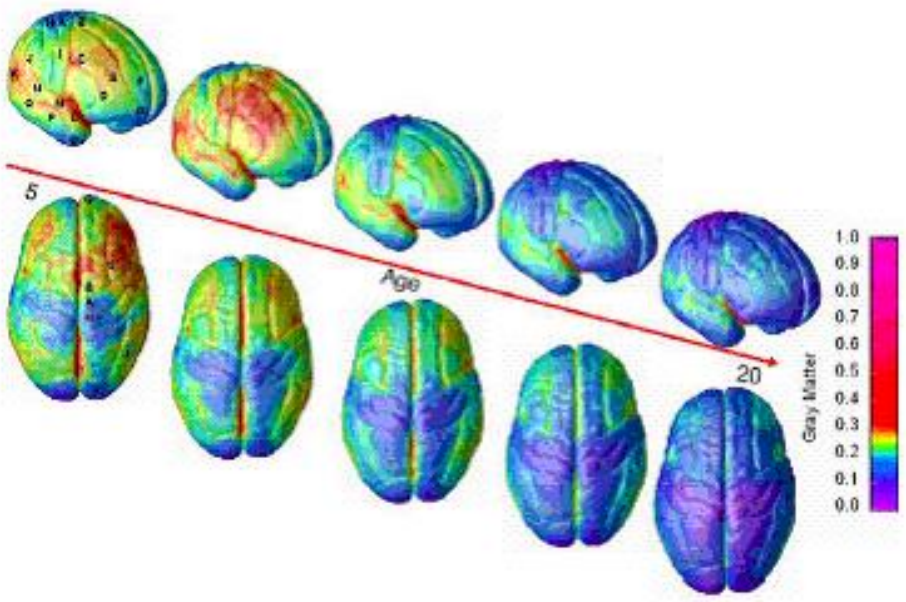
Neural Circuits are Wired in a Bottom-Up Sequence

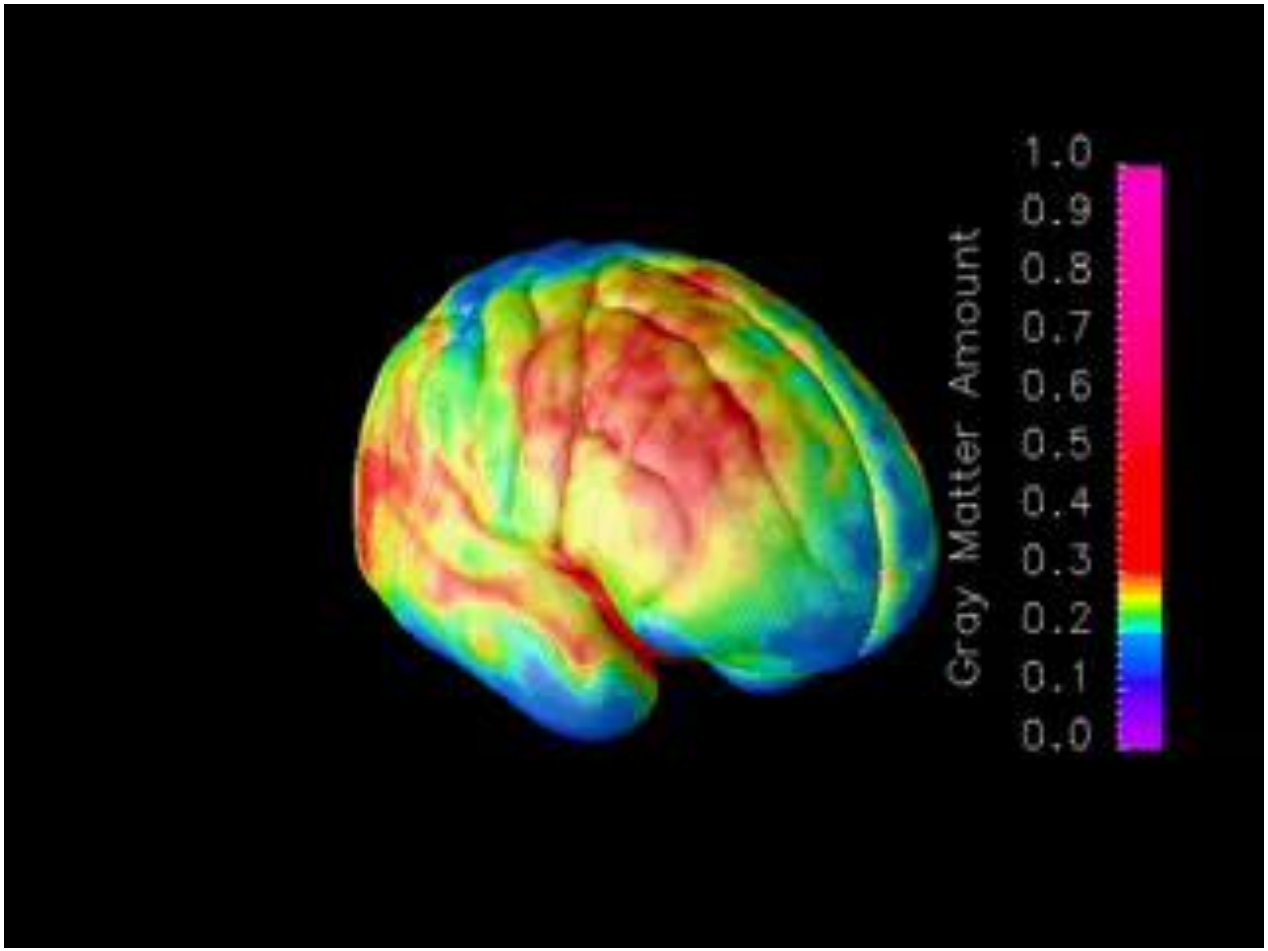


Source: C.A. Nelson (2000)

Executive Function Development

- Prefrontal cortex is slow maturing area of the brain; development into young adulthood
- Cells that "fire together, wire together"




Gray Matter Amount
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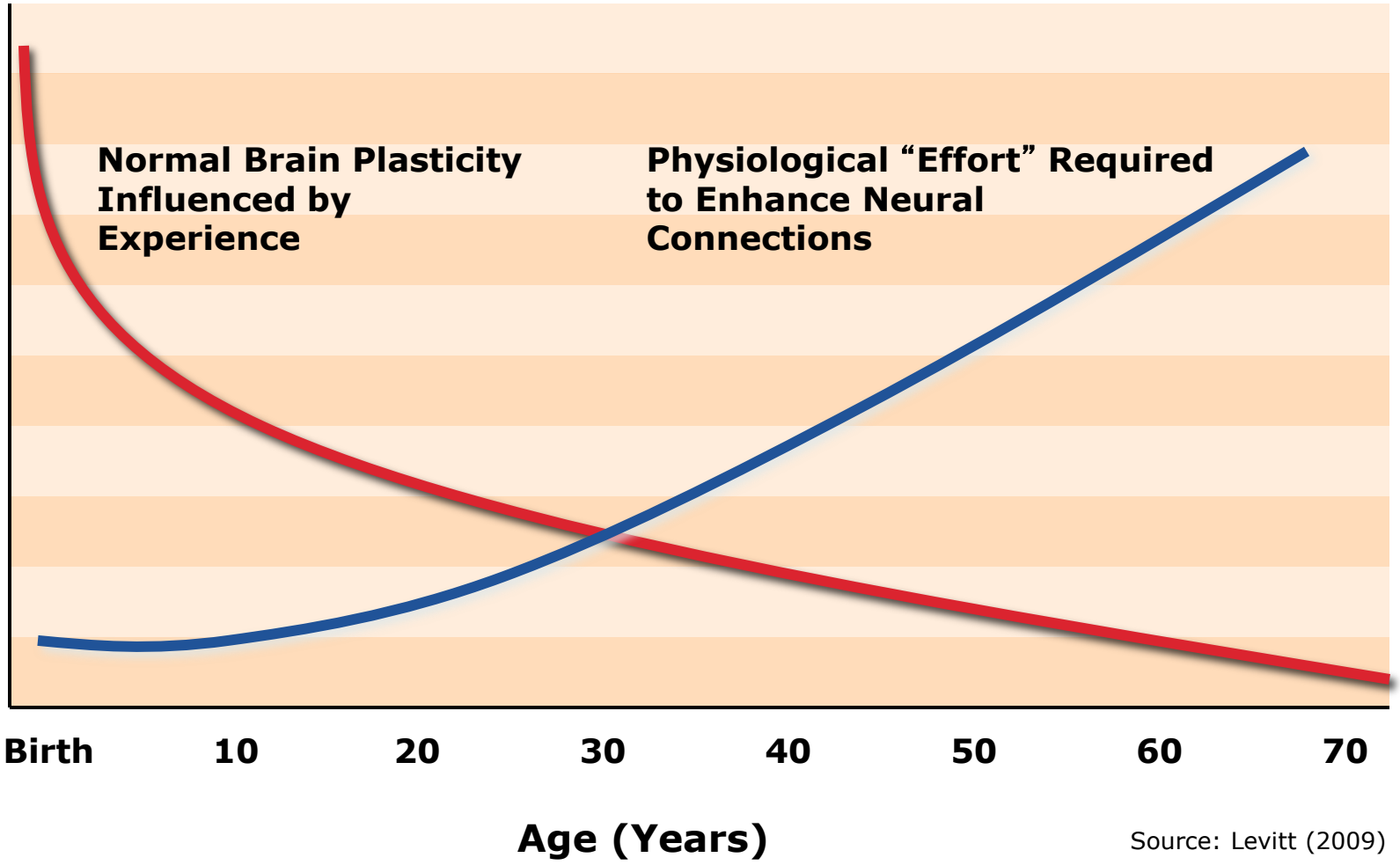
The Ability to Change Brains Decreases Over Time



Source: Levitt (2009)

Psychobiological model

- The context in which child development takes places shapes children's self-regulation
- Effects of experience on children's development
  - Parenting and Family
  - Neighborhoods and Communities
  - Classrooms and Schools

Psychobiological model

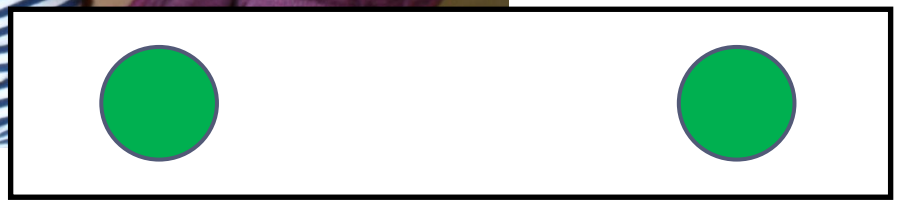
- Moderate, short-lived stress can build a healthy stress response system
- Toxic stress — excessive activation of the stress response system — tunes the brain to be reactive rather than well regulated

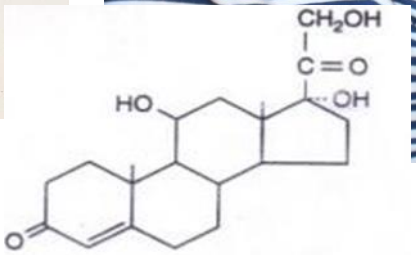
Family Life Project

- Longitudinal, population based sample (N = 1,292) followed from birth in predominantly non-urban, low-income communities in North Carolina and Pennsylvania
  - Program project funded by NICHD
  - Data collection in the home at 7, 15, 24, 36, 48, and 60 months of age to assess aspects of parenting and family ecology
  - Child emotion, attention, stress physiology, and executive functions

Family Life Project

"Here's another picture. Which of these… is the same as this new one?"

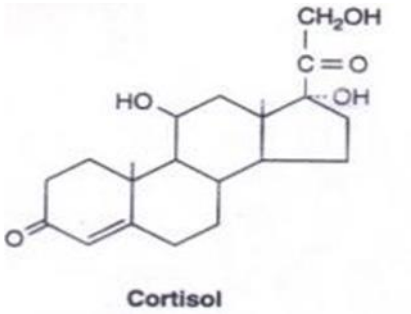




Cortisol

The Stress Response System

- Cortisol – a steroid hormone detectable in saliva
- Prepares the body and mind for response to the unexpected and unusual
- In the short run, a very good thing

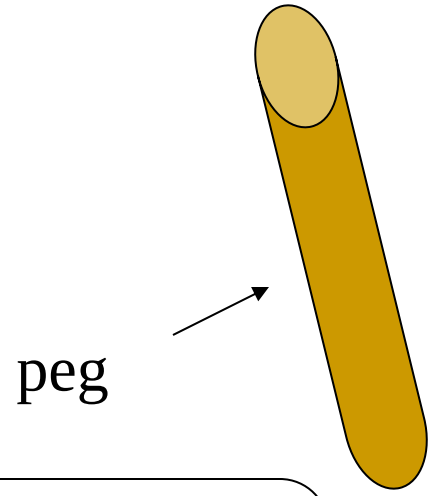


Cortisol

Emotional Reactivity and Regulation

Executive Function

When I tap one time, you tap two times …

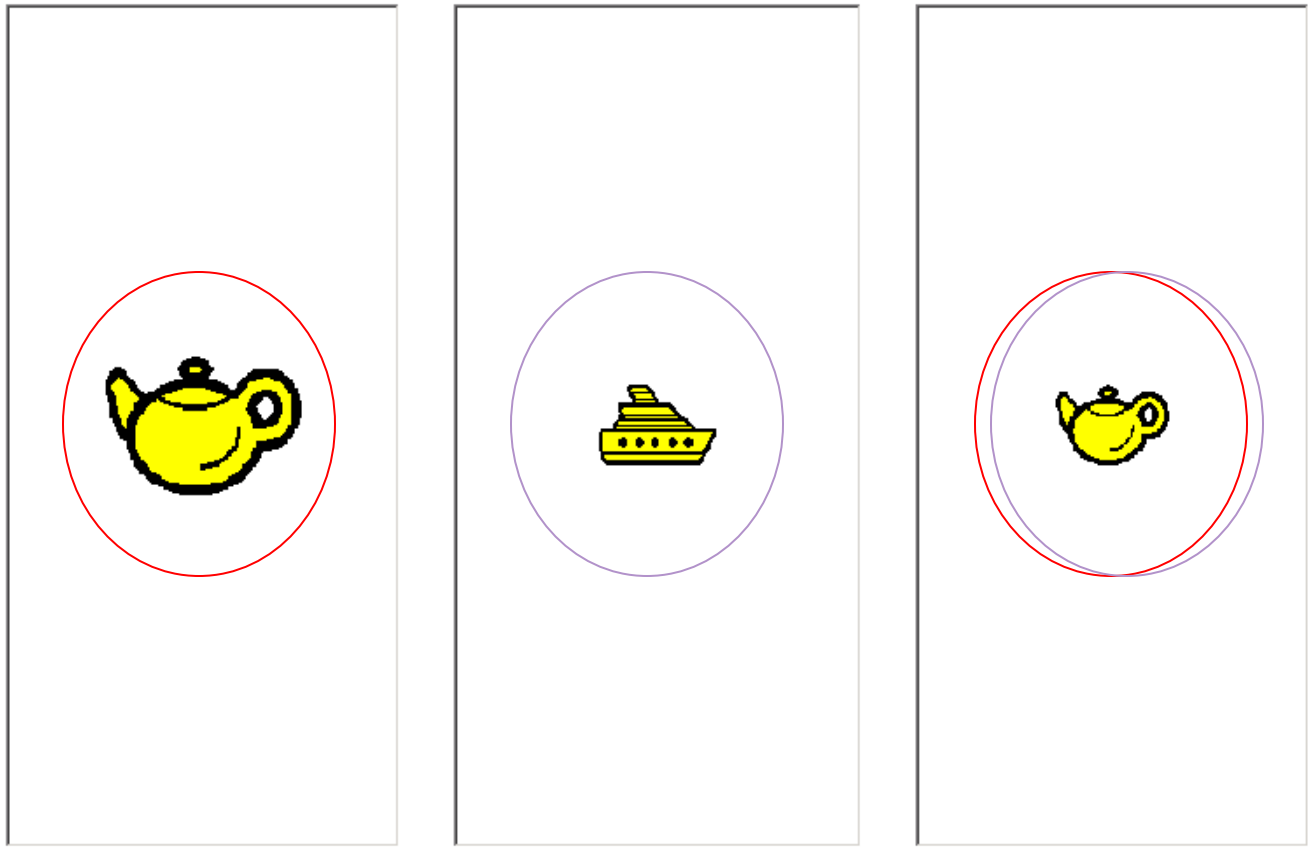


okay…

…and when I tap two times, you tap one time.

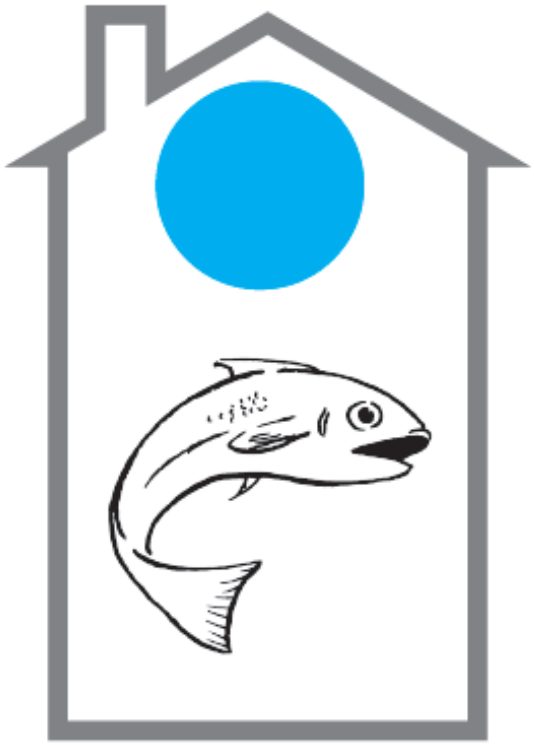
alright …

Executive Function

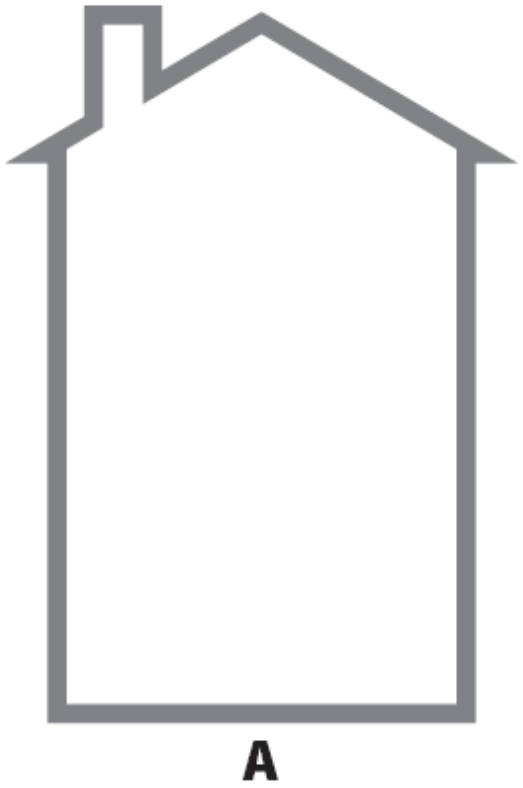


from Jacques and Zelazo (2001), *Developmental Neuropsychology*

Executive Function

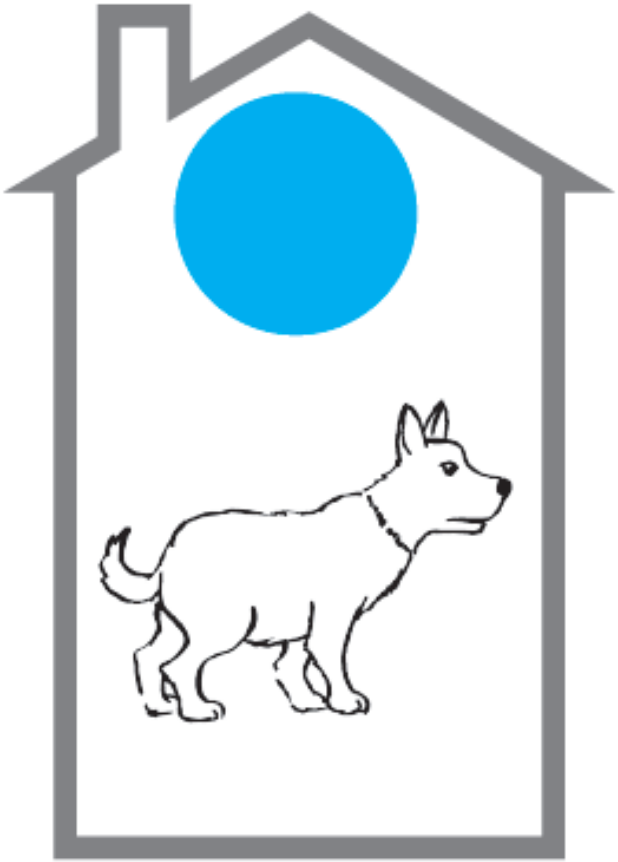


Executive Function

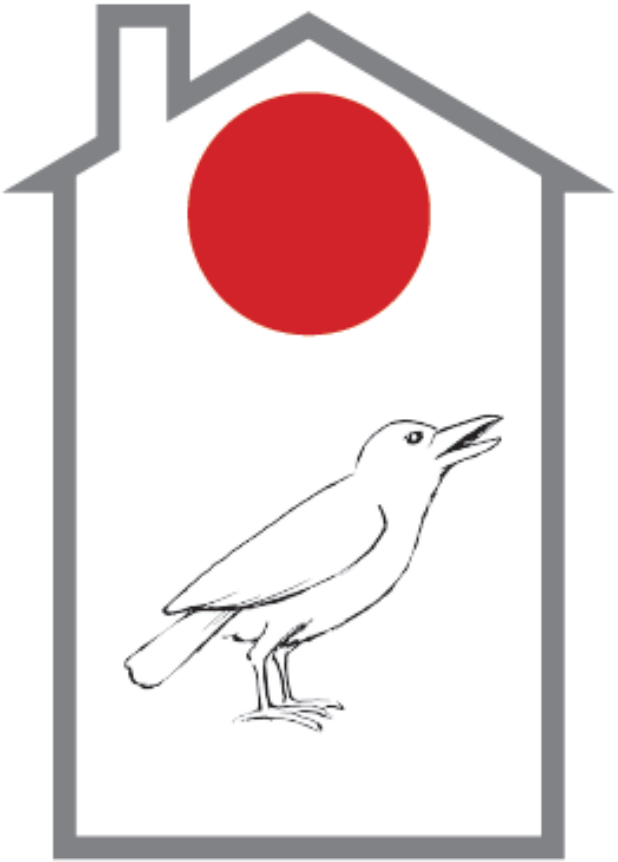


Item 1

Executive Function

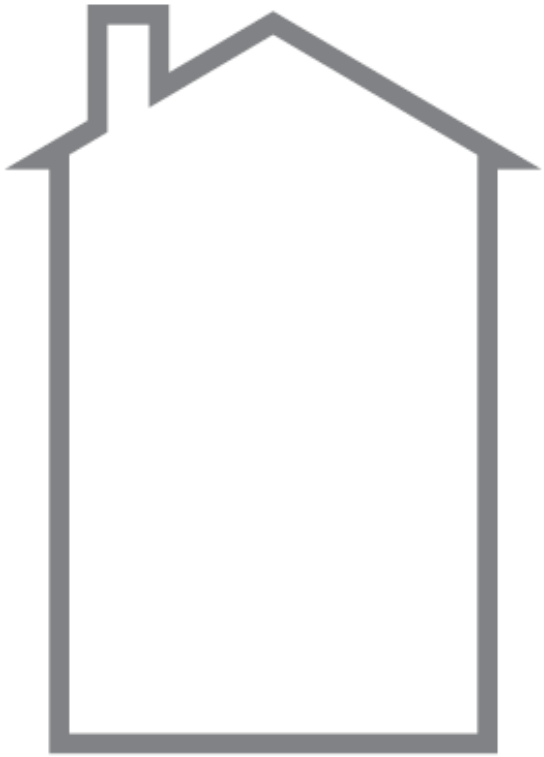


A



B

Executive Function



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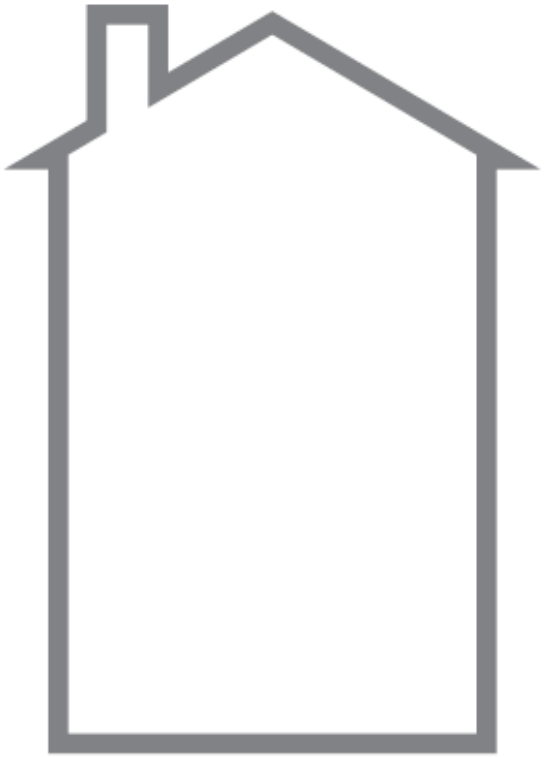


B

Executive Function

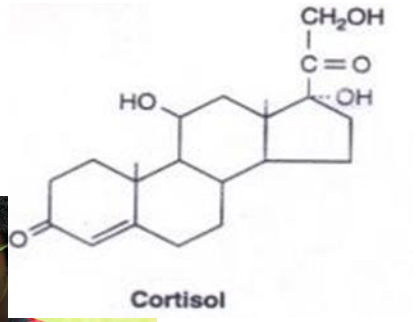
Executive Function

Executive Function

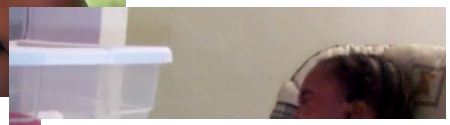
Executive Function

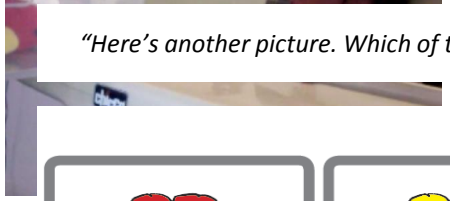
Parenting

- Parenting
  - Sensitivity
  - Scaffolding
  - Positive regard
  - Stimulation for development
  - Detachment
  - Intrusiveness



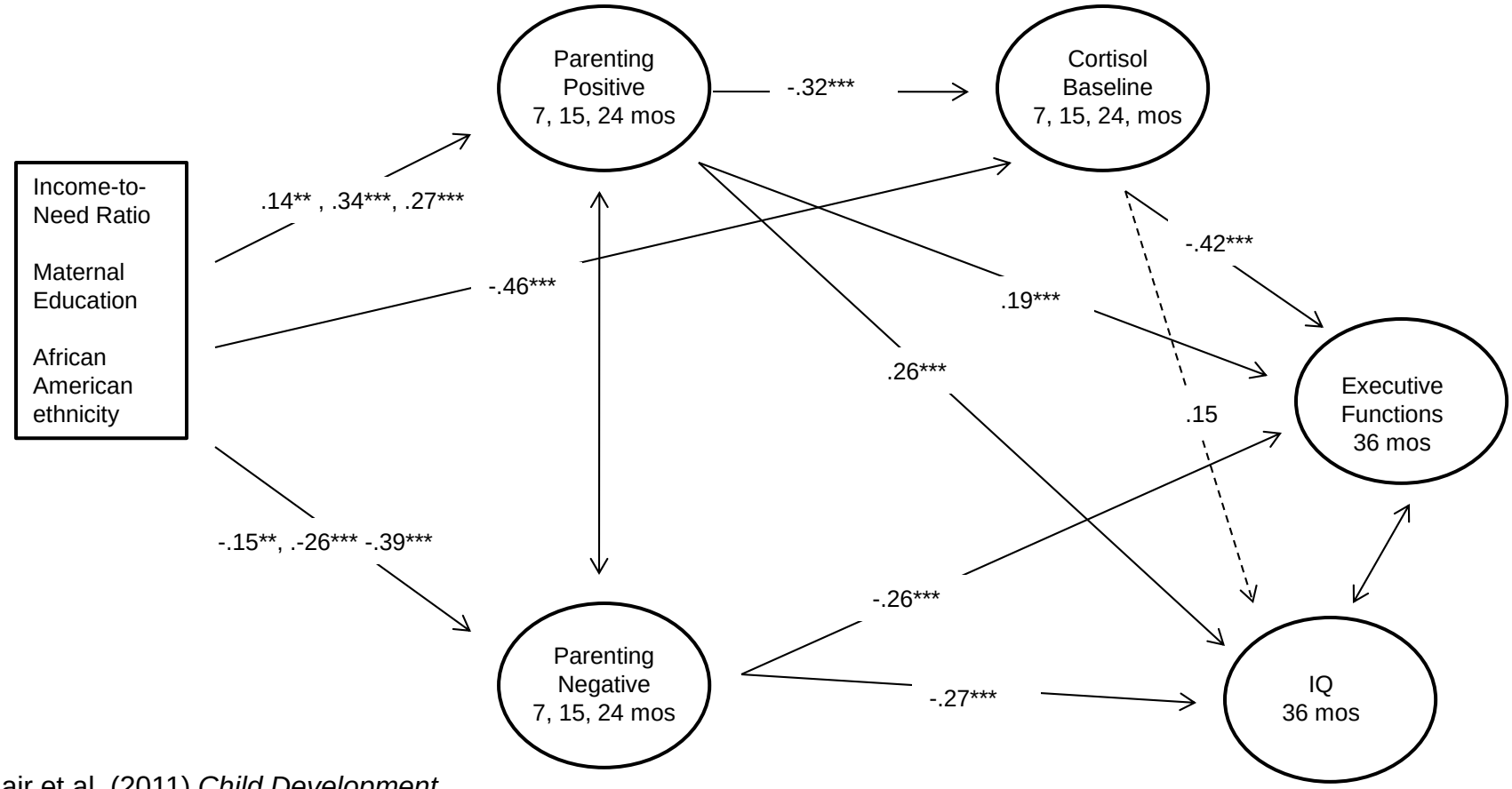
Cortisol





"Here's another picture. Which of these… is the same as this new one?"

Executive Function at age 3 years



Blair et al. (2011) *Child Development*

School Readiness

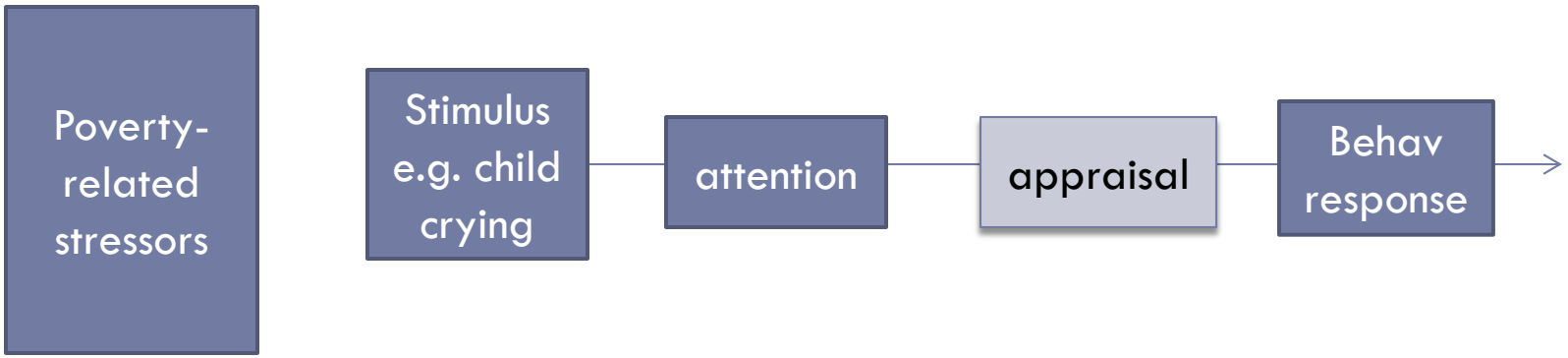
- Basic knowledge, skills, letters, numbers, etc.
- But also to…
  - take turns, communicate wants and needs verbally
  - be enthusiastic and curious in approaching new activities
  - pay attention and follow directions, not be disruptive, be sensitive to other children's feelings

School Readiness

- Executive functions are essential for school readiness and early school achievement
  - Go hand-in-hand with basic knowledge, skills, letters, numbers, etc.
- Are executive functions and self-regulation a primary path through which poverty affects children's chances for success in school and in life?
- If so, what can we do about it?

Supporting Self-Regulation

- A focus on early caregiving and support for self-regulation in parents in poverty
- Poverty-related stressors hypothesized to shape adult self-regulation
- Stress will be associated with negative appraisals of parenting and child behavior



Supporting Self-Regulation

- "Buffering Toxic Stress" Consortium – 6 projects funded by ACF Early Head Start – University partnership grants
- Programs to support parenting in poverty can alter developmental process leading from stress in caregivers to stress in children and poor self-regulation, executive function problems, deficits at school entry
- Projects have 3 goals
  - Validation
  - Implementation
  - Experimental Evaluation

The NYU ABC Project

- 204 families recruited through Early Head Start grantees and medical clinics in NYC area
- Predominantly Spanish speaking sample
- Pretest, post-test, and post-post home visits for data collection

Playing and Learning Strategies (PALS)

- Developed by Susan Landry, University of Texas at Houston, Children's Learning Institute (CLI)
- 14-week curriculum
- Sessions include: signals, warm responsiveness, guiding child's behavior, labeling, etc.
- Review of concept (includes watching of PALS DVD clips), videotaped coaching session, and review of coaching session
- Certification Process: two taped sessions are reviewed by CLI for approval
- Ongoing supervision and support for HVs delivering the curriculum through project-funded Clinical Supervisor

The NYU ABC Project

- Expectations for efficacy of effective parenting program
  - Video-based training orients parents' focus of attention to child verbal and nonverbal cues
  - Offer means of changing parents' framing or appraisal of child behavior, parenting competence
  - Offer alternative coping strategy (behavioral response) that has higher likelihood of "working" – child compliance, etc. serve immediate reinforcement, "payoff"

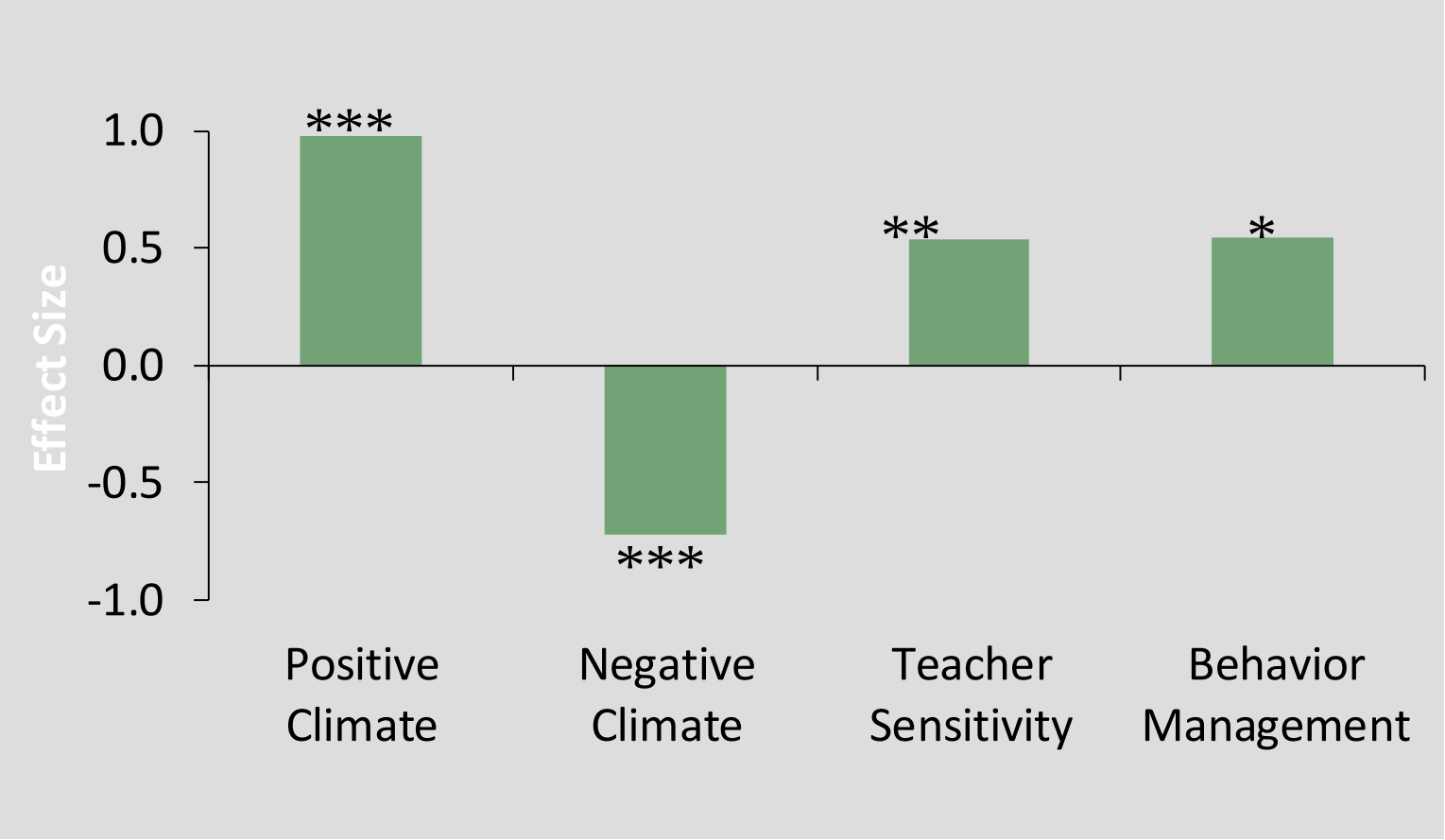
Workforce Development & Job Experience

- In addition to coaching new parenting strategies, PALS requires skills in video, IT, information management
  - 9 out of 10 HVs had between 2-10 yrs. experience as ECE teachers
  - Few HVs had relevant past work experience; many new to home visiting
  - 70% reported that PALS pushes them to learn new computer skills
  - 100% reported being pushed to learn new record-keeping skills
  - 100% reported that they would recommend PALS to other Home Visitors
  - 80% reported it has increased confidence in skills

Early Education

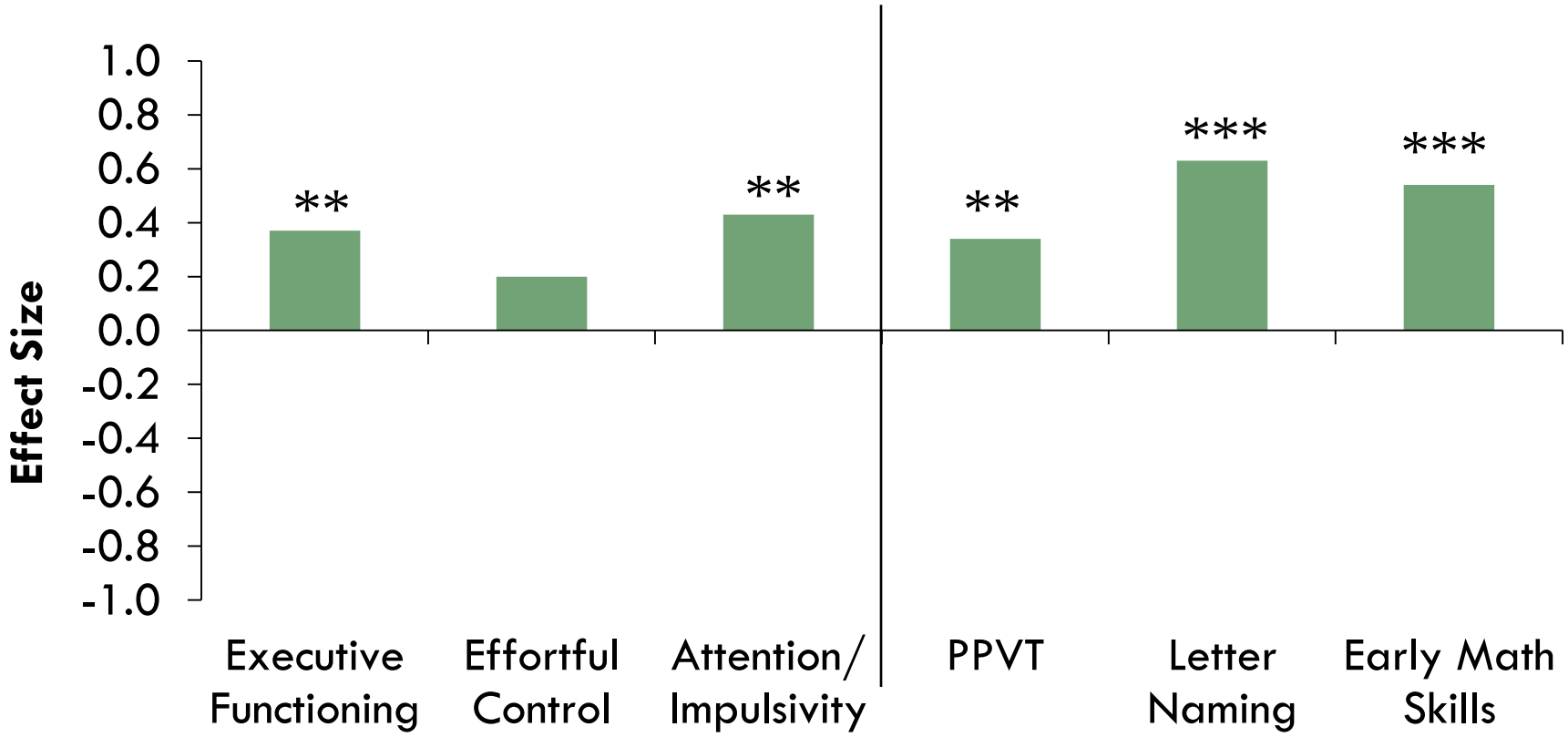
- Chicago School Readiness Project (Cybele Raver, PI)
  - Teacher training and coaching by a mental health consultant to improve the emotional climate of the classroom, lower children's level of conflict with peers, and lower teacher stress
  - Improving the emotional climate should reduce self-regulation challenges for children and teachers, increase attention focus and executive function, and increase learning outcomes
  - N=509 children in 35 Head Start classrooms

Impacts on CLASS, end HS Year



SOURCE: Raver, Jones, Li-Grining, Metzger, Champion, & Sardin (2008), *Early Childhood Research Quarterly.*
NOTES: Significance levels are indicated as * $p < 0.10$; ** $p < 0.05$; *** $p < 0.01$.

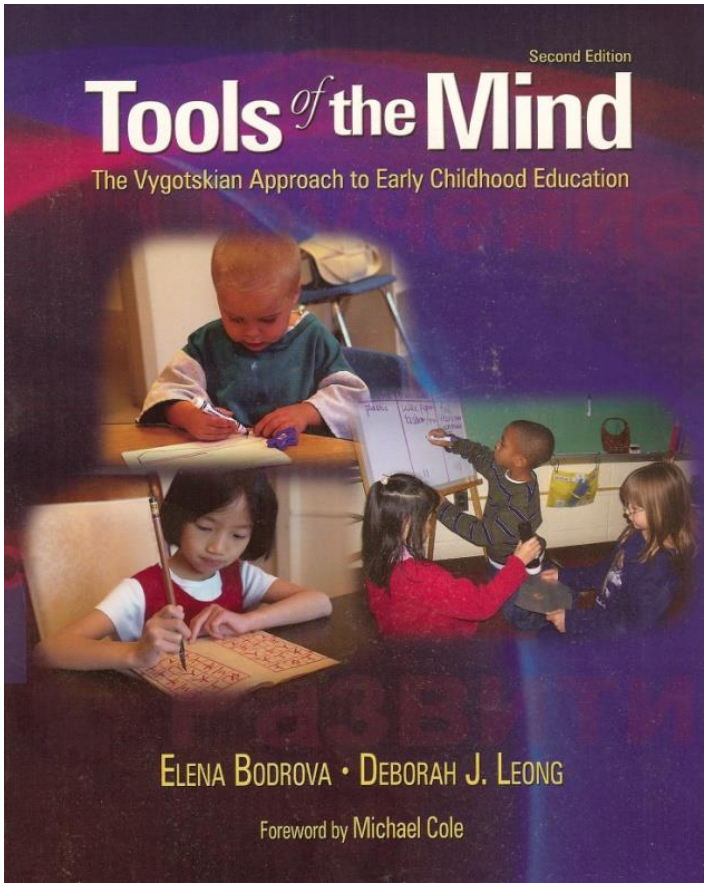
CSRP: Impacts on Children's Self-Regulation and Pre-Academic Skills



SOURCE: Raver, Jones, Li-Grining, Zhai, Bub, & Pressler, 2008

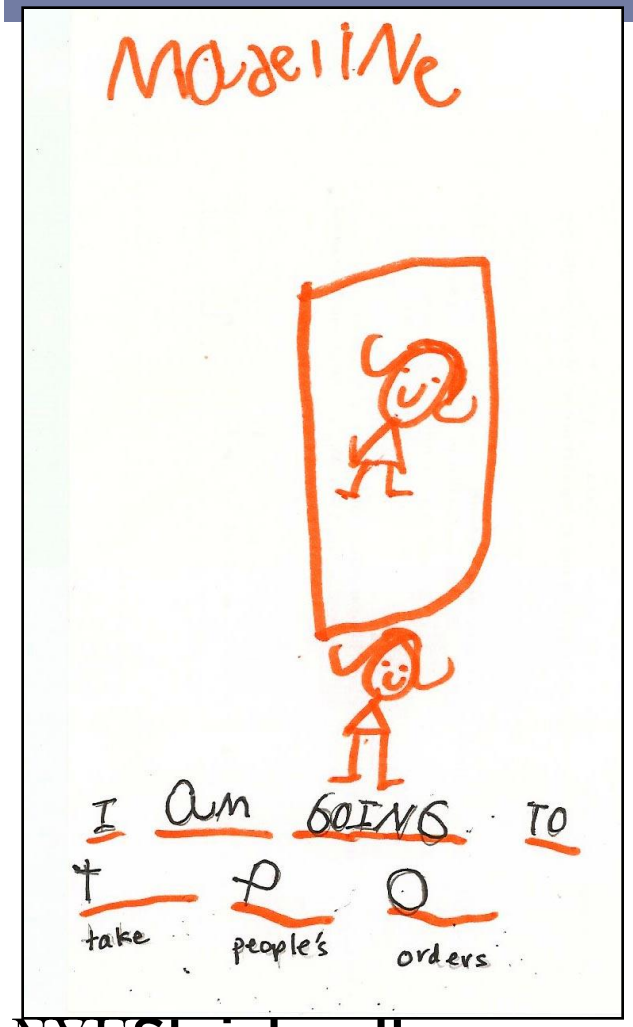
NOTES: Significance levels are indicated as * $p < 0.10$; ** $p < 0.05$; *** $p < 0.01$.

Early Education



- Child-directed
- Teacher-scaffolded
- Planned in advance
- Play-based
- Regulation with peers
- Embedded academic content

Play Plans



Cognitive Self-Regulation

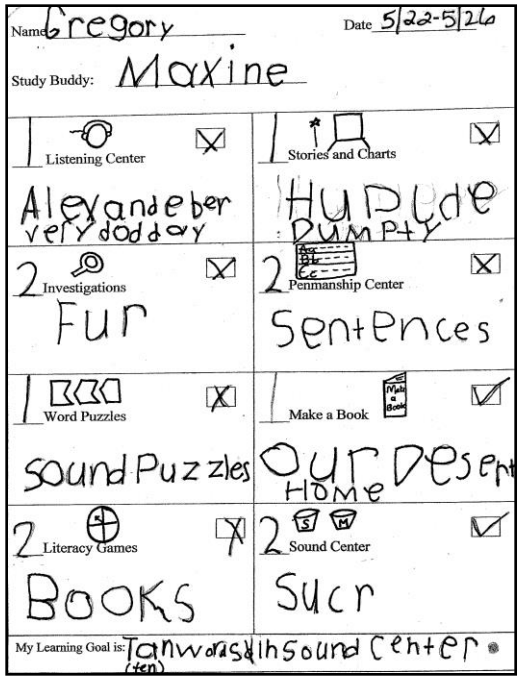
- Children are asked to talk about how they "know things"
- Children act as a checker for another child, practicing a version of "reflection on action"

Tools of the Mind

- Professional Development for Teachers
  - Understanding the development of EF/Self Regulation
  - How and why of activities and how they contribute to the development of EF/Self-Regulation
  - Tools philosophy of teaching and learning
  - Activities with self-regulation practice as a focus
  - Teachers' perspectives change as children become more regulated

Tools of the Mind in Kindergarten

Tools of the Mind in Kindergarten

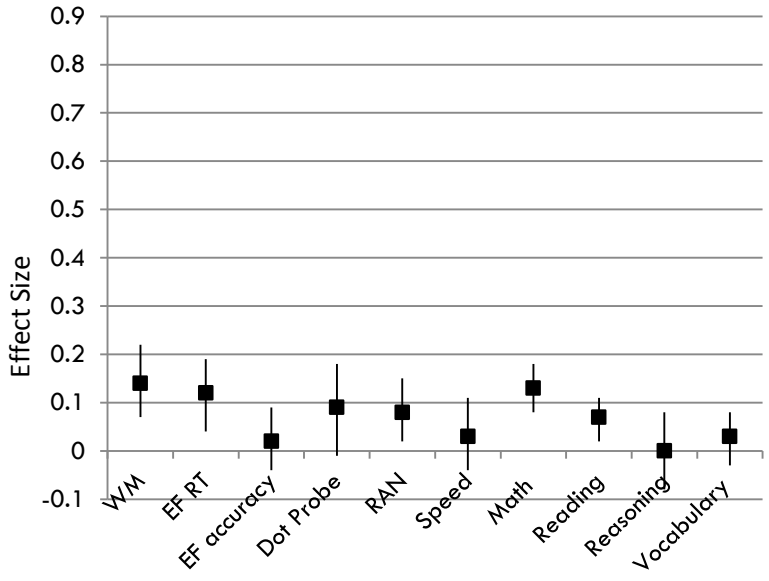


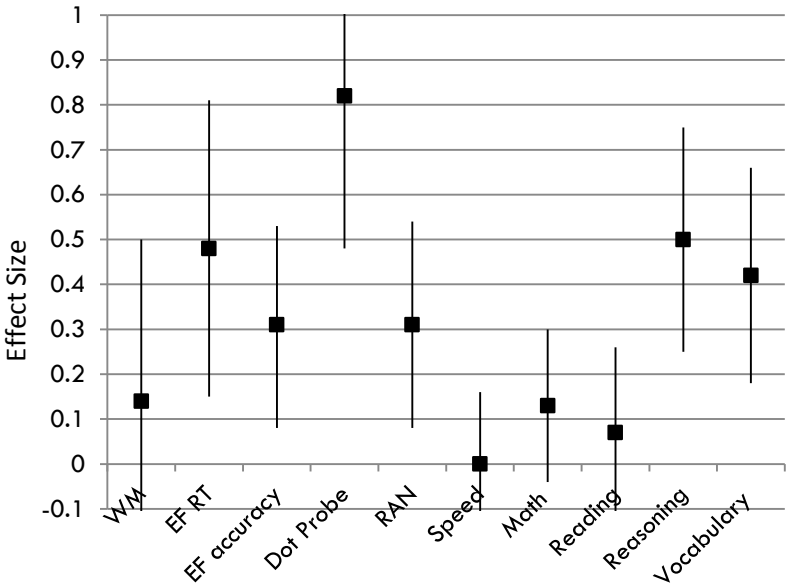
- Children play games based on fictional narratives
- Children follow a learning plan, complete a work product, and set learning goals

Tools of the Mind Kindergarten

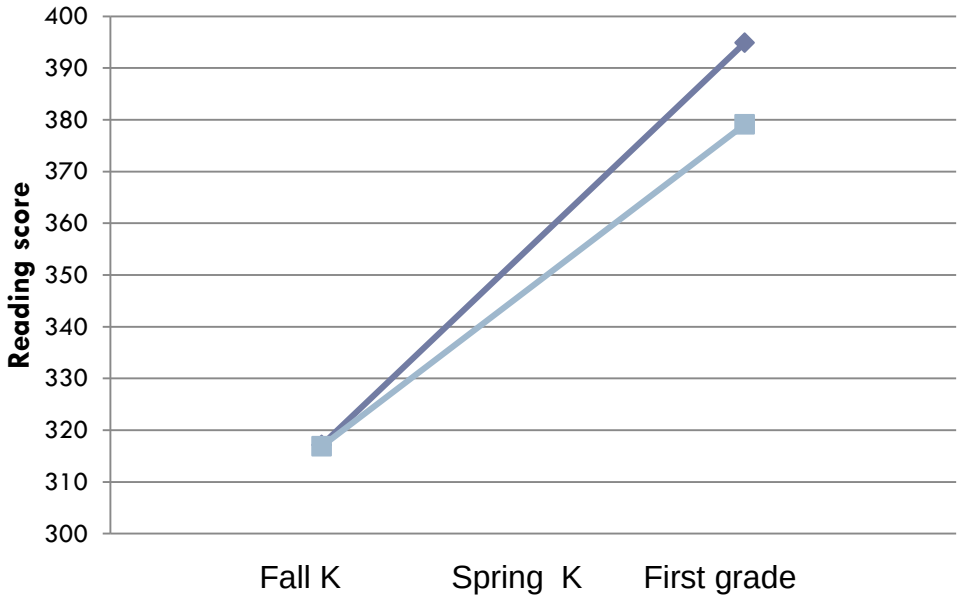
- Cluster randomized controlled trial at the School level
- 12 districts, 29 schools, 79 classrooms, 725 children
- Schools ranged from 3% to 92% free/reduced lunch eligible
- Fall and Spring of K, follow-up in Fall of first grade

Tools of the Mind Kindergarten



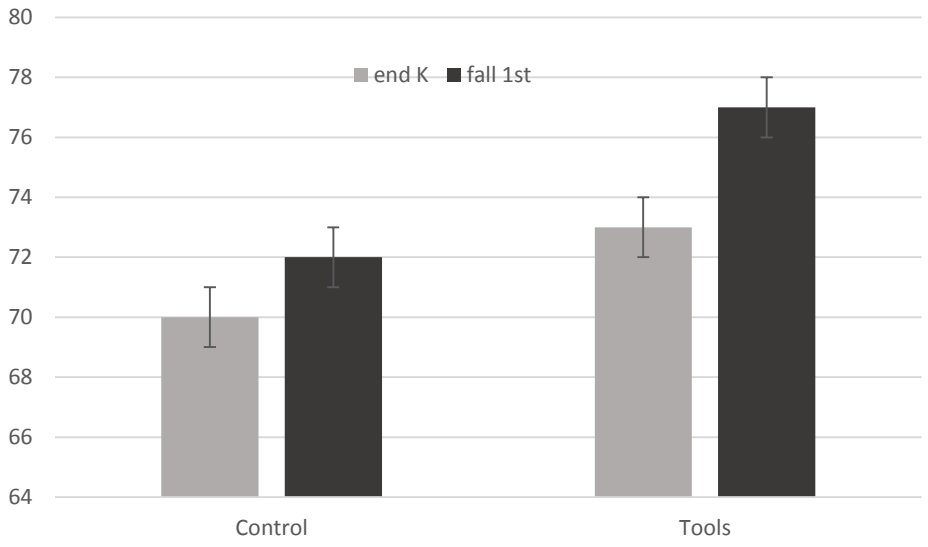


Growth in reading

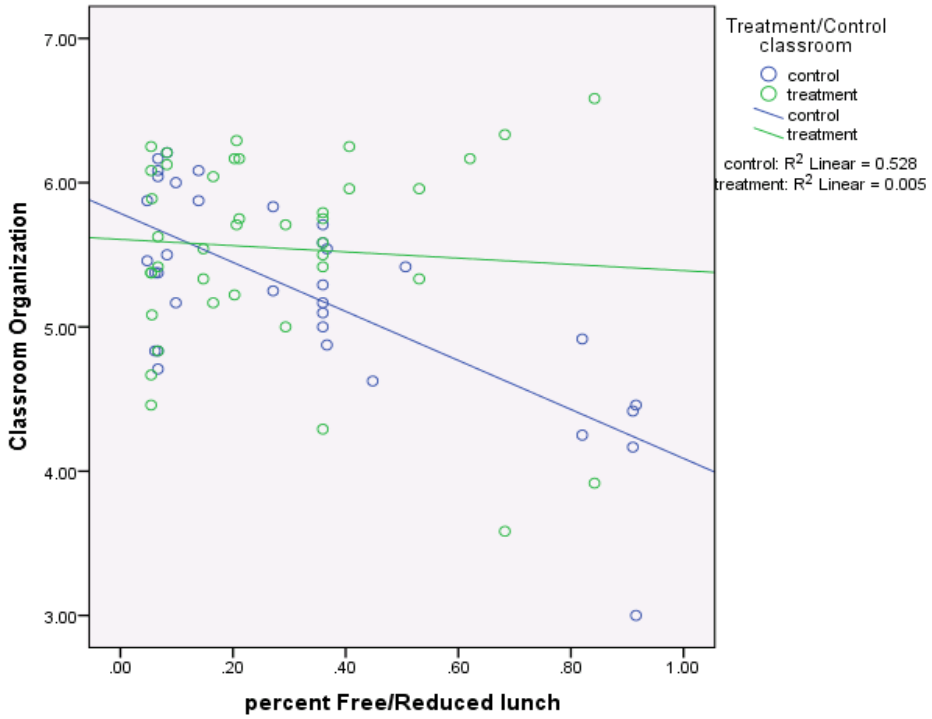


Effect of the Tools of the Mind curriculum on growth in reading (linear slope) from the beginning of kindergarten through the fall of first grade, b=3.88, se=1.21, p=.001.

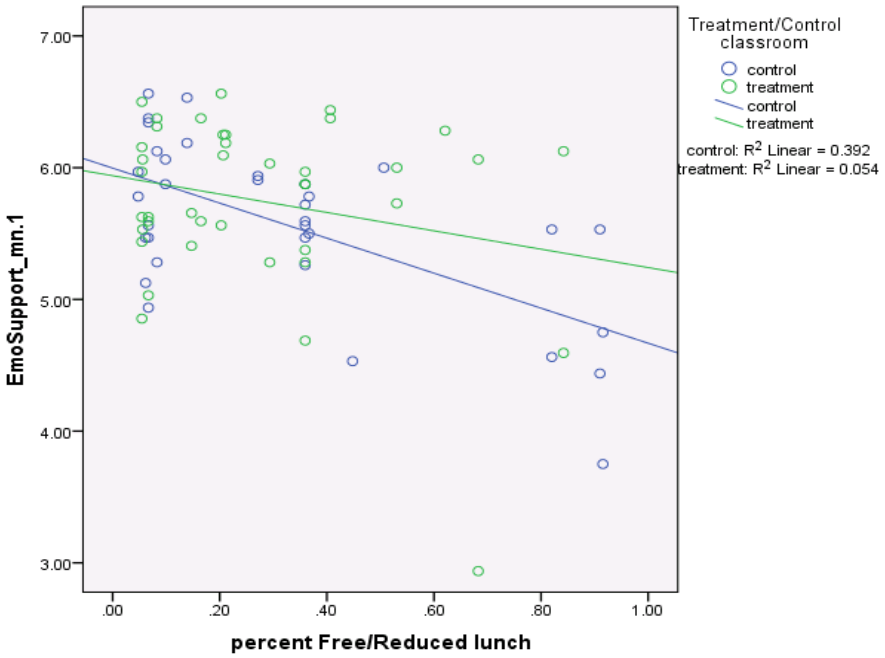
Growth in Vocabulary

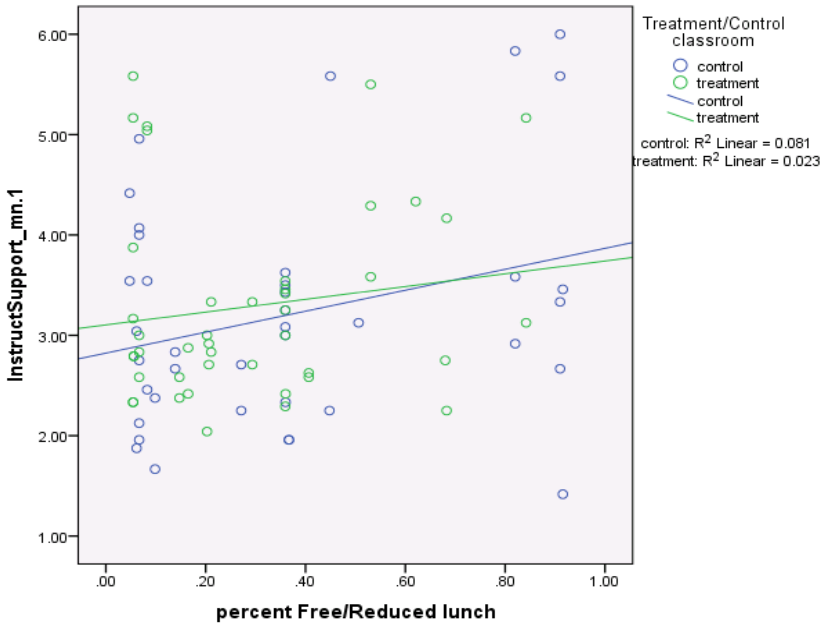


Classroom quality in Tools K



Classroom quality as mechanism





Classroom Quality

- Self-regulation as a focus for definition and measurement of classroom quality
- The social-emotional environment of the classroom
- The teacher-child relationship

Conclusions and Implications

- School and community efforts can recognize healthy child development at multiple levels (genes, physiology, emotion, cognition, parenting, schooling)
- Research and theory suggest the importance of the regulation of stress; not that stress is inherently harmful but is something to be managed – controllable vs. uncontrollable

Executive Functions

- Executive functions
- …are dependent on effective self-regulation
- …are likely one aspect of the SES related achievement gap
- …are one common pathway through which child development intersects with home and school experiences

Supporting Self-Regulation

- Early childhood experience can be understood in terms of process models not only as input-output models
- Education for children can be structured/enacted in ways that promote healthy development by focusing on self-regulation

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Funding
National Institute of Child Health and Human Development
R03 HD39750 , P01 HD39667, R01 HD51502 (ARRA)
Institute of Education Sciences R305A100058

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